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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/666,198	09/17/2003	Martin A. Afromowitz		8791

7590

01/11/2005

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EXAMINER

WALKE, AMANDA C

ART UNIT

PAPER NUMBER

1752

DATE MAILED: 01/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/666,198

Applicant(s)

AFROMOWITZ, MARTIN A.

Examiner

Amanda C Walke

Art Unit

1752

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 September 2003.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-7 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-7 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 17 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Priority*

1. This application appears to be a division of Application No. 09/902029, filed 7/10/2001. A later application for a distinct or independent invention, carved out of a pending application and disclosing and claiming only subject matter disclosed in an earlier or parent application is known as a divisional application or "division." The divisional application should set forth the portion of the earlier disclosure that is germane to the invention as claimed in the divisional application.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-7 are rejected under 35 U.S.C. 102(e) as being anticipated by Lapin et al (6,251,557).

Lapin et al disclose a photosensitive resin composition for use in rapid prototyping, and in particular, a resin made from both a cationic curable epoxy resin system and a radical-curable acrylate system. The process of the present invention is advantageous in case the curing is performed with a laser, the laser is motion controlled with a computer, with the laser beam focused on a relatively tiny area of the pre-determined desired to-be-cured area, so as to have the laser scan over the to-be-cured area to at least substantially initiate the cure of the photosensitive

Art Unit: 1752

resin composition. Presently preferred lasers are the helium/cadmium and the argon ion lasers. Particularly preferred are bisphenol resins such as bisphenol-A or bisphenol-F based epoxy resins. These type of resins are commercially available. Both liquid and solid bis-phenol based epoxy resins exist. Examples of suitable epoxy resins include EPON.RTM. resins from Shell such as EPON.RTM. 1001, 1002 and 1003. Analogous products exist e.g. from Dow Chemical as DER 661 and higher homologous. Other examples of suitable solids epoxy resins are the epoxy-novolac with about 6 phenol groups and an epoxy equivalent weight of about 200 (ERR 0100 from Union Carbide) and the polyglycidylether of o-(resol-formaldehyde)Novolac. Although UV-curing is preferred, as the photosensitive compositions are exposed to visible light easily, visible light curable photosensitive compositions have the same advantages. In particular, laser curing can be suitably be performed with visible light-lasers. In that case, the photoinitiator system has to be adapted with the use of suitable sensitizers and/or initiators to give good cure at wavelength of about 400 to about 600 nm.

The resin composition according to the invention is preferably used with a rapid prototyping process involving the use of a photomask to build objects. Such a method is, for instance, described in U.S. Pat. No. 5,519,816 which is incorporated herein by reference. In that method, a high power UV lamp is used to flood-expose one layer of a liquid photopolymer at a time through a negative, or mask. The mask is generated electrostatically on a glass plate with a toner powder. A 2 to about 20 second exposure from the lamp will usually be sufficient to solidify a thin surface layer of a photopolymer. The exposed mask is physically wiped clean and electrostatically discharged to prepare it for the next cross-section image. At the same time, the uncured photopolymer, which is still liquid, is blown (air-knifed), vacuumed or washed away.

Art Unit: 1752

The cavities left by the uncured polymer are filled with hot wax. The wax solidifies to form a support structure for the next layer. Finally, the entire surface is milled with a cutter to make it ready for the next polymer layer. The cycle is repeated, so that the object is built up layer by layer. The resin composition according to the present invention is advantageously used in such a process, not only because of the very good mechanical properties, but also because the resin has the capability of achieving good through cure (no phase-separation on cure), with sharp cured-uncured boundaries, and very little photomask contamination.

The liquid epoxy resin, together with the liquid acrylate compounds can be used to adjust the viscosity of the prec-cured composition to a suitable range. In particular, the viscosity of the photosensitive resin composition can be between about 100 mPa.s and about 3000 mPa.s, measured at the application temperature. For laser-cured rapid-prototyping processes, the viscosity preferably is between about 100 mPa.s to about 500 mPa.s, whereas the viscosity for processes that uses a photo-mask, the viscosity preferably is between about 1,000 mPa.s to about 3,000 mPa.s at the application temperature. The application temperature can be varied according to selected components of the resin composition and the other parameters used in the process. Preferably the application temperature can be between about 25.degree. C. to about 40.degree. C. and more preferably between about 30.degree. C. to about 32.degree. C.

The resin composition of the present invention exhibits good mechanical properties upon cure. In particular, it is possible to achieve upon full cure a film of about 75 .mu.m thickness having a secant modulus of higher than about 1,000 MPa (at 2.5 % elongation), and an elongation above about 5%, and preferably higher than about 8%.

Art Unit: 1752

Given the teachings of the method and resulting 3-dimensional product taught by Lapin et al, the instant claims 1-7 are anticipated.

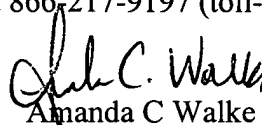
***Conclusion***

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Melisaris et al (6,413,697), Smetana et al (6,350,792), Akutsu et al (5,985,510), Ohe et al (6,045, 953), and Kubo et al (6,465,540) are cited for their teachings of similar products.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Amanda C Walke whose telephone number is 571-272-1337. The examiner can normally be reached on M-R 5:30-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia Kelly can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Amanda C Walke  
Examiner  
Art Unit 1752

ACW  
January 10,2005